Appendix C: Priority Watersheds and Conservation Watershed Network

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Introduction

One of the original purposes for establishing the National Forest System was to protect our Nation's water resources. The 2012 planning rule includes a newly created set of requirements associated with maintaining and restoring watersheds and aquatic ecosystems, water resources, and riparian areas on the national forests. The increased focus on watersheds and water resources in the 2012 planning rule reflects the importance of this natural resource, and the commitment to stewardship of our waters.

The 2012 planning rule requires that plans identify watersheds that are a priority for restoration and maintenance. The 2012 planning rule requires all plans to include components to maintain or restore the structure, function, composition, and connectivity of aquatic ecosystems and watersheds in the plan area, taking into account potential stressors, including climate change, and how they might affect ecosystem and watershed health and resilience.

Plans are required to include components to maintain or restore water quality and water resources, including public water supplies, groundwater, lakes, streams, wetlands, and other bodies of water. The planning rule requires that the Forest Service establish best management practices for water quality, and that plans ensure implementation of those practices.

Plans are also required to include direction to maintain and restore the ecological integrity of riparian areas. The Custer Gallatin National Forest proposes to maintain riparian areas through ecological desired conditions striving to maintain ecosystems as a whole as well as specific riparian and aquatic standards, guidelines, and management approaches. This direction will also protect native fish and further strengthen the watershed condition framework priority watersheds and Watershed Conservation Network.

Watershed Condition Framework

In 2011, sixth-level watersheds (typically 10,000 to 40,000 acres) across all National Forest lands were classified using the national watershed condition framework. This framework was designed to be a consistent, comparable, and credible process for improving the health of watersheds across all National Forest lands. The first step was to rate the watershed condition of each watershed, utilizing existing data, knowledge of the land, and professional judgment. Watersheds were rated using a set of indicators of geomorphic, hydrologic, and biotic integrity relative to potential natural condition. The ratings are entered into a computer database, which generates an overall rating for each watershed. The results are also used to create a watershed condition class map.

Geomorphic functionality or integrity is defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics. Hydrologic functionality or integrity relates primarily to flow, sediment, and water-quality attributes. Biological functionality or integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity.

In each case, integrity is evaluated in the context of the natural disturbance regime, geoclimatic setting, and other important factors within the context of a watershed. The definition encompasses both aquatic and terrestrial components because water quality and aquatic habitat are inseparably related to the integrity and functionality of upland and riparian areas within a watershed. The three watershed classes are as follows:

- Class 1- functioning properly: watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

- Class 2 functioning-at-risk: watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
- Class 3 impaired: watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

In this framework, a watershed is considered in good condition if it is functioning in a manner similar to one found in natural wildland conditions. This characterization would not be interpreted to mean that managed watersheds cannot be in good condition. A watershed is considered to be functioning properly if the physical attributes are appropriate to maintain or improve biological integrity. This consideration implies that a class 1 watershed in properly functioning condition has minimal undesirable human impact on natural, physical, or biological processes and is resilient and able to recover to the desired condition when or if disturbed by large natural disturbances or land management activities. By contrast, a class 3 watershed has impaired function because some physical, hydrological, or biological threshold has been exceeded. Substantial changes to the factors that caused the degraded state are commonly needed to set them on a trend or trajectory of improving conditions that sustain physical, hydrological, and biological integrity.

The Custer Gallatin NF is located in 269 subwatersheds. Eighty-one of these are in pine savanna Geographic Areas, while 188 are in montane Geographic Areas. Following the watershed condition class protocol in 2016, 221 watersheds were rated as functioning properly, 48 watersheds were rated as functioning at risk, and none were rated as impaired. Of the functioning at risk watersheds 20 were in pine savanna Geographic Areas, while 28 were in montane Geographic Areas. Table C-1 is a summary of watershed condition classes across the Custer Gallatin NF by Geographic Area.

Table C-1. 6th level watersheds rated in each condition class using the watershed condition framework

Geographic Area	Class 1	Class 2	Class 3	Total
Sioux	35	7	0	42
Ashland	26	13	0	39
Pryor Mountains	9	0	0	9
Absaroka Beartooth Mountains	72	12	0	84
Bridger, Bangtail, and Crazy Mountains	24	11	0	25
Madison, Gallatin, and Henrys Lake Mountains	55	5	0	60
Total	**221**	**48**	**0**	**269**

The next step of the watershed condition framework was to use the watershed condition class data to identify priority watersheds, develop watershed action plans, and implement projects to maintain or restore conditions in priority watersheds. Since the onset of the watershed condition framework the Custer Gallatin NF has moved 3 priority watersheds to an improved state which include Pass Creek, Upper South Fork Sixteen Mile Creek, and Odell Creek.

Benefits from implementing the watershed condition framework are as follows:

- Strengthens the effectiveness of Forest Service watershed restoration.
- Establishes a consistent, comparable, credible process for determining watershed condition class.
- Enables a priority-based approach for the allocation of resources for restoration.
- Improves Forest Service reporting and tracking of watershed condition.

- Enhances coordination with external agencies and partners.

Priority Watersheds

Current forest priority watersheds on the Custer Gallatin NF are displayed in Table C-2. Future priority watersheds will be re-evaluated and determined throughout the life of this plan based on budget, partnerships, public input, and resource needs.

Priority areas for potential restoration activities could change quickly because of events such as wildfire or the introduction of invasive species. Therefore, the 2012 planning rule includes priority watersheds as plan content, so that an administrative change could be used to quickly respond to changes in priority.

Table C-2. Current priority watersheds on the Custer Gallatin NF

HUC 6 Watershed Name	Attributes Rated at Risk in Watershed Condition Framework Assessment	Partnerships	Notes
Bozeman Creek	Water quality and quantity (303d listed); channel shape and function; non-native species; FRDD rating of at-risk; Insect and disease puts Forest Health at-risk; road density	City of Bozeman, Montana Fish Wildlife and Parks, Montana Department of Natural Resources	Opportunity for forest and riparian area restoration through treatments
Upper Hyalite Creek	Water quality and quantity (303d listed); channel shape and function; non-native species; FRDD rating of at-risk; Insect and disease puts forest health at-risk; road density	City of Bozeman, Montana Fish Wildlife and Parks, Montana Department of Natural Resources	Opportunity for forest and riparian area restoration through treatments
Shields River-Bennett Creek	Water quality; habitat fragmentation; channel form and function; non native species; FRCC rating at-risk;	Montana Fish Wildlife and Parks	Opportunity to conserve Yellowstone cutthroat trout by eradicating non-native brook trout as a barrier was installed in 2016; reduce sedimentation and increase fish passage through installation of AOPs

Restoration of Impaired Waterbodies

In 1972 Congress passed the Water Pollution Control Act, more commonly known as the Clean Water Act. Its goal is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Clean Water Act requires each state to set water quality standards to protect designated beneficial water uses and to monitor the attainment of those uses. Fish and aquatic life, wildlife, recreation, agriculture, industrial, and drinking water are all types of beneficial uses. Streams and lakes (also referred to as waterbodies) that do not meet the established standards are called "impaired waters." These waters are identified on the 303(d) list, named after Section 303(d) of the Clean Water Act, which mandates the monitoring, assessment, and listing of water quality limited waterbodies.

Both Montana state law (75 MCA § 5-703) and section 303(d) of the federal Clean Water Act require the development of total maximum daily loads for impaired waters where a measurable pollutant (for example, metals, nutrients, e. coli) is the cause of the impairment. A total maximum daily load is a loading capacity and refers to the maximum amount of a pollutant a stream or lake can receive and still meet water quality standards.

The Montana Water Quality Act requires the Montana Department of Environmental Quality (MT DEQ) to develop total maximum daily loads for streams and lakes that do not meet, or are not expected to meet, Montana water quality standards. The MT DEQ submits the total maximum daily loads to the United States Environmental Protection Agency for approval. Total maximum daily loads provide an approach to improve water quality so that streams can support and maintain their state-designated beneficial uses.

According to the MT DEQ 303(d) list, 34 stream segments on the Custer Gallatin NF are not meeting water quality standards (Table C-3). Sixteen of these are listed for agriculture related impacts, 8 are mining or AML related, 3 are natural, 3 are forest roads, 2 are irrigation, and the remaining 2 are land development impacts. A 303 (d) listing does not necessarily indicate that Forest Service practices are contributing to the listing even when a stream segment intersects Forest Service lands. First a 303 (d) listing can, and does occur, when an initial and often qualitative analysis indicates there may be an impairment to beneficial use (s). It can then take the MT DEQ on the order of years to investigate this thoroughly and come up with a definitive conclusion sometimes leading to that stream being taken back off the list. Second when impairment has indicated Custer Gallatin NF may be contributing to impairment the Custer Gallatin NF has a history of addressing and resolving those issues. For example Upper Taylor Creek (HUC 100200080107) and Lower Taylor Creek (HUC 100200080108) are on the 303 (d) list for sediment input to streams from Forest Service roads (as far as Forest Service impacts are concerned). The Forest Service has invested millions of dollars in those drainages decommissioning and re-routing roads, replacing culverts, and improving road surfaces substantially decreasing Forest Service road sediment sources such that impairment can no longer be attributed to the Forest Service yet those streams remain on the list.

Table C-3. 303(d) listed stream segments by GA*

Geographic Area	Number of stream segments	Sources of Pollutants	TMDL Assessments
Sioux	0	n/a	n/a
Ashland	1	Natural sources	Otter Creek
Pryor Mountains	0	n/a	n/a
Absaroka Beartooth Mountains	12	Largely impacts from mining and AML.	Boulder River, Clarks Fork Yellowstone River
Bridger, Bangtail, and Crazy Mountains	9	Primarily agriculture and grazing.	Bear Creek, Jackson Creek, Bridger Creek, Shields River
Madison, Gallatin, and Henrys Lake Mountains	13	Primarily natural sources and forest road construction. Some silvicultural activities and grazing. Land development in the Big Sky area, none of which is on National Forest lands.	Hyalite Creek, West Fork Gallatin, South Fork West Fork Gallatin

* MT DEQ 303 listing will change throughout the life of this plan.

Conservation Watershed Network

A conservation watershed network is a designated collection of watersheds where management emphasizes habitat conservation and restoration to support native fish and other aquatic species. The goal of the network is to sustain the integrity of key aquatic habitats to maintain long-term persistence of native aquatic species. Designation of conservation watershed networks, which could include watersheds that are already in good condition or could be restored to good condition, are expected to protect native fish and help maintain healthy watersheds and river systems. Selection criteria for inclusion could help identify those watersheds that have the capability to be more resilient to ecological change and disturbance induced by climate change. For example, watersheds containing unaltered riparian vegetation will tend to protect streambank integrity and moderate the effects of high stream flows. Rivers with high connectivity and access to their floodplains will experience moderated floods when compared to channelized and disconnected stream systems. Wetlands with intact natural processes slowly release stored water during summer dry periods, whereas impaired wetlands are likely less effective retaining and releasing water over the season. For all of these reasons, conservation watershed networks represent the best long-term conservation strategy for native fish and their habitats.

Many watersheds in the Absaroka Beartooth and Madison, Gallatin, Henrys Lake Mountains Geographic Areas that support healthy populations of native trout and/or other aquatic organisms already have their headwaters protected through lands managed as Congressionally-designated wilderness areas (Absaroka Beartooth and Lee Metcalf Wilderness). These locations are the building blocks of a conservation network as naturally functioning headwaters have a large influence on the function of downstream stream reaches.

The best available science indicates the Custer Gallatin NF is and will be an important stronghold for conservation of native salmonids (westslope and Yellowstone cutthroat trout) across their range and also will be important habitat for native warm-water prairie fish ecosystems in the Sioux and Ashland Geographic Areas. For montane watersheds, Montana Fish Wildlife and Parks and Forest Service data were used to identify watersheds with larger metapopulations of westslope and Yellowstone cutthroat trout and isolate populations of westslope and Yellowstone cutthroat trout above natural or constructed barriers. These watersheds were included as part of the conservation watershed network in Table C-4. Data collected by the Forest Service from 2015 to 2017 was examined to identify watersheds that consistently have an assemblage of native fish in the pine savanna Geographic Areas. Only one watershed was identified and is also included in Table C-4.

Table C-4. Conservation Watershed Network subwatersheds

Subwatershed/6th Code HUC (HUC #)	6th Code HUC Acres
Absaroka Beartooth Mountains Geographic Area Subwatersheds	
East Fork Mill Creek (100700020304)	20,923
Elbow Creek (100700020401)	18,833
Fourmile Creek(100700020903)	20,118
Lower Mill Creek (100700020305)	22,257
Middle Slough Creek(100700010706)	36,803
Passage Creek (100700020301)	13,586
Upper East Boulder River (100700020701)	36,219
Upper Lower Deer Creek (100700021404)	16,382
Upper Mill Creek (100700020302)	21,591
Upper Slough Creek (100700010705)	30,026
Upper Soda Butte Creek (100700010702)	37,564
West Fork Mill Creek (100700020303)	25,895
Willow Creek (100700061005)	32,362
Bridger, Bangtail and Crazy Mountains Geographic Area Subwatersheds	
Bangtail (100700030502)	8,260
Bennet Creek-Shields River (100700030301)	31,910
Canyon (100700030501)	14,015
Carrol (100700030201)	19,184
Cottonwood (100700030402)	23,515
Elk (100901020208)	19,754
Muddy (100700030204)	13,470
Rock (100700030405)	33,902
Upper Flathead (100700030202)	14,650
Upper South Fork Sixteen Mile (100301010201)	17,124
Willow (100700030503)	19,888
Madison, Gallatin, and Henrys Lake Mountains Geographic Area Subwatersheds	
Bozeman Creek (100200080904)	33,236
Elkhorn Creek (100200080302)	15,980
Grayling Creek (100200070305)	32,750
Hebgen Lake (100200070307)	40,373
Lower Big Creek (100700020203)	22,649
Middle Cherry Creek (100200071402)	11,180
North Fork Spanish Creek (100200080401)	20,788
Rock Creek (100700020201)	18,233
Tepee Creek (100200070306)	14,398
Upper Beaver Creek (100200070402)	18,649
Upper Cherry Creek (100200071401)	13,265
Upper Hyalite (100200081001)	31,067
Pryor Mountains Geographic Area Subwatersheds	
Commissary Creek-Crooked Creek (100800100501)	13,739

Subwatershed/6th Code HUC (HUC #)	6th Code HUC Acres
Lost Water Creek-Crooked Creek (100800100501)	21,618
North Fork Sage Creek-Sage Creek (100800140401)	31,025
Piney Creek-Sage Creek (100800140404)	38,861
Sioux Geographic Area Subwatersheds	
Upper Crooked Creek (101303010104)	18,033